Potential Climate Change Vulnerabilities - Adapted from the CA Climate Adaptation Strategy (CCAS)

	Drivers								
	Higher Temperatures	**Earlier snowmelt**	**More rain, less snow**	**More extreme flood events**	**Longer, more frequent droughts**	**Decrease in Freeze events**	**Sea Level Rise**	**More Erosion**	**More frequent & intense wildfires**
Water Management	Change in runoff timing; reduced cold water pool for meeting instream temp requirements; higher demands	Less water supply due to storage loss; water mgmt more difficult at multipurpose reservoirs	Less water supply; poor water quality; more stress on levees; less groundwater recharge	Levee stress/ failure; impacts to resevoir operations (flood control and storage); damage to conveyance	Less water supply; higher demands; reduced recreational opportunities; poor water quality; less groundwater recharge	Higher ag demands from longer growing season	Levee stress/ failure; higher demand to meet WQ[1] standards; saltwater intrusion; damage to conveyance	Levee stress/ failure; poor water quality; damage to conveyance	Higher demands for fire fighting; poor WQ from flash floods; accelerated runoff
Agriculture	More ET[2]; increased moisture deficits; longer growing season; higher demands; shifts in crop type; increase in pests/ disease[3]	Less summer water supply; reduced water supply reliability	More floodplain inundation; levee stress; reduced water supply reliability; shifts in crop types	Levee stress/ failure; reduced productivity; crop loss from flood events	Less supply; higher demands; reduced productivity; invasive species; increase in pests/ disease; shifts in crop types	Longer growing season; higher demands; invasive species; increase in pests/ disease; shifts in crop types; decreased yield (crop specific)	Levee stress/ failure; saltwater intrusion; inundation; poor WQ; loss of ag land	Levee stress/ failure; poor water quality; loss of ag land	Poor WQ; loss of range lands; crop loss
Forests	More ET; increased moisture deficits; longer growing season; biodiversity shifts; increase in pests/ disease	Increased moisture deficits; biodiversity shifts	Reduced biomass; biodiversity shifts	Increased erosion; changes to riparian vegetation	Reduced biomass; increase in pests/ disease; biodiversity shifts; invasive species; increase in fire frequency/intensity	Longer growing season; invasive species; increase in pests/ disease	Coastal access-road damage from storm surges: economical and recreational losses	Reduced water quality; reduced productivity for aquatic species	Reduced biomass; more disease; biodiversity shifts; altered fire regime; economic and recreational losses; increased erosion
Ecosystems	Increased water temp and moisture deficits;biodiversity shifts; increase in disease/ invasives; phenological[4] changes	Barriers to species migration/ movement; phenological changes	Biodiversity shifts; increased water temp; reduced stream flow; invasive species	Poor WQ; reduced productivity; biodiversity shifts; economic and recreational losses; stream channel changes	Stream flows altered; biodiversity shifts; invasive species; increase in diseases; loss of ecosystem goods and services	Longer growing season; biodiversity shift; increase in disease/ invasive species; phenological changes	Loss of ecosystem goods and services; biodiversity shifts; loss of tidal wetland habitat; saltwater intrusion	Poor WQ; reduced productivity; displacement; stream channel changes	Fire regimes altered; habitat loss; poor WQ; biodiversity shifts; economic and recreational losses
Public Health & Safety	Mortality rates increase; poor air quality; allergens increase; less water supply; Illnesses[5] exacerbated	Less water supply	Change in prevalence & spread of disease; reduced water supply reliability; poor water quality	Change in prevalence & spread of diseases; mortality; displacement[6]	Change in prevalence & spread of diseases; mortality; reduced water supply reliability; increased malnutrition	Higher pesticide use; allergens increase; Illnesses exacerbated	Displacement; illness due to poor water quality;	Displacement; poor water quality; mudslides	Poor water quality; poor air quality; displacement; Illnesses, esp. respiratory, exacerbated; mortality; mudslides
Infrastructure	Higher summer energy demand; increased outages	Less summer/ fall hydropower production	Less summer/ fall hydropower production; more reservoir spills	Damage to transportation, wastewater, and energy infrastructure	Higher energy demand; reduced water supply; increased outages	Higher agricultural energy demand	Structural damage and inundation in coastal areas	Damage to transportation, wastewater, and energy infrastructure	Damage to transportation, wastewater, and energy infrastructure
Coastal Resources	Productivity reduced; biodiversity shifts; changes in commercial & recreational fisheries	N/A	Freshwater outflow reduced during summer/fall	Poor WQ; sediment transport altered	Poor WQ; less coastal fog; reduced freshwater outflow	N/A	Flooding & inundation; reduced ag; displacement; reduced tourism; loss of tidal wetlands	Poor WQ; displacement	Poor water quality; biodiversity shifts; habitat loss; economical and recreational losses

[1]WQ = Water quality

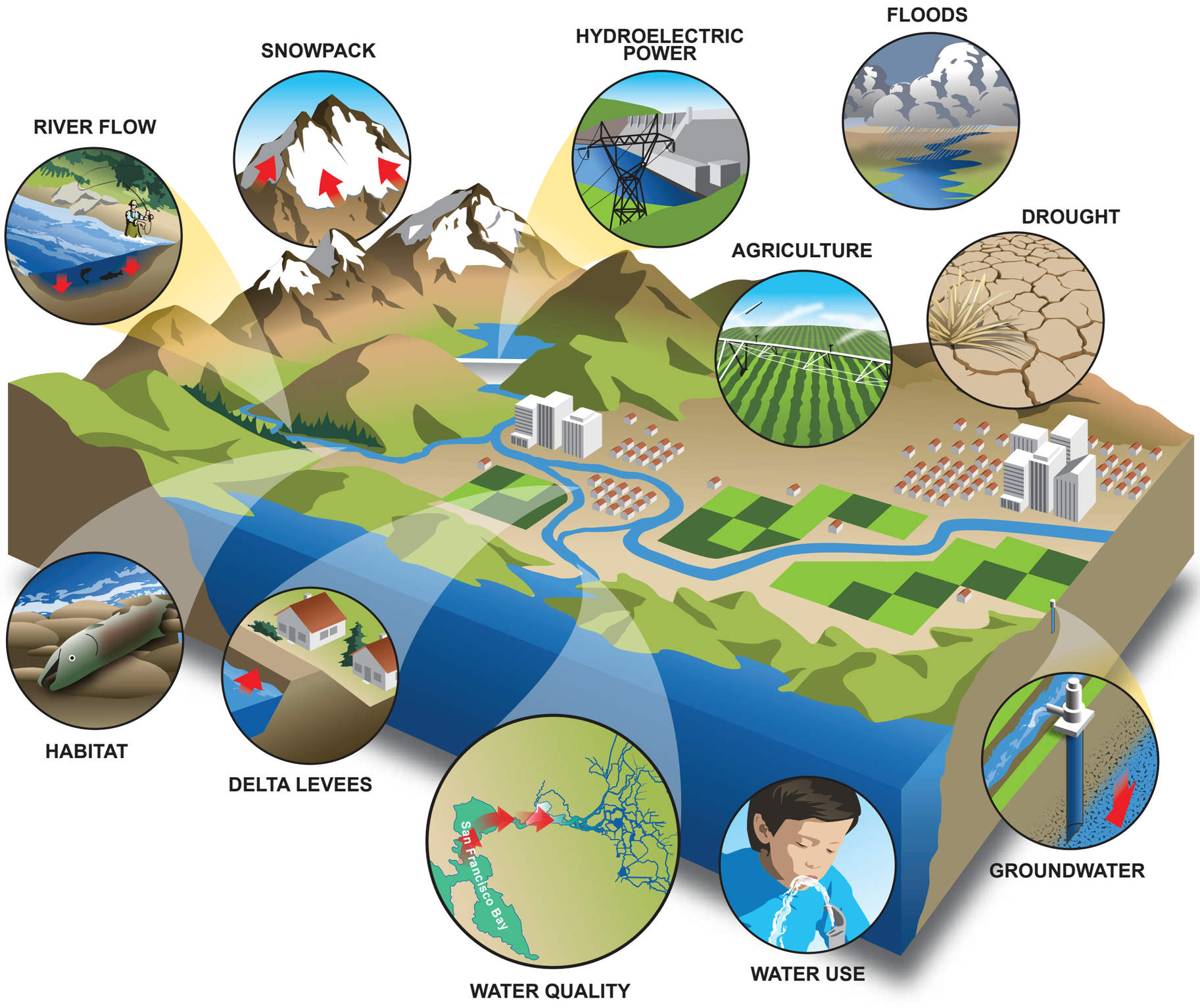
[2]ET = Evapotranspiration

[3] Pests/disease - for agriculture the increase in pests and diseases could in turn result in higher use of pesticides, fungicides, and/or herbicides

[4]Phenological - predator/prey and plant/pollinator timing altered due to climatic changes

[5]Illnesses - includes chronic, infectious, and vector borne diseases

[6]Displacement - encompasses associated health consequences, including mortality, due to economic disruption, loss of personal income, and disruption of social networks.


FLOODS
HYDROELECTRIC POWER
SNOWPACK
RIVER FLOW
DROUGHT
AGRICULTURE
HABITAT
DELTA LEVEES
San Francisco Bay
WATER QUALITY
WATER USE
GROUNDWATER